

Zimmerman patent. In addition, dependent claims 66-69, 71-74, 77 and 79 dependent from independent claim 65 were also rejected over this combination of references. However, for the following reasons, it is submitted that these claims are all allowable over the noted references.

In amended independent claim 65, it is now specifically claimed that the two spaced TV cameras provided on the display are [pointed in substantially a same direction away from said display] This recitation has been added to reinforce the fact that a "stereo pair of images" are used in the present invention. In addition, it is these "stereo pair of images" that are "photogrammetrically" analyzed to determine the 3D position as further claimed.

In amended independent claim 80, a similar recitation of the two TV cameras pointing in the same direction and the stereo pair of images thus produced being used photogrammetrically is claimed. It will also be appreciated that the determination made in this claim is the "three dimensional orientation" of the datums. Such a 3D orientation includes pitch, roll and yaw; which is obviously different from any X, Y, and Z coordinates used to determine a position.

In amended independent claim 81, limitations similar to claim 80 are also recited.

In the Oh patent, no disclosure is made of a pair of cameras being pointed in substantially a same direction. Rather, the two cameras disclosed are evidently used to view an object from two relatively orthogonal directions, so that images in an X-Y plane and in an X-Z plane are obtained. A suitable "unit 333 converts the two-dimensional coordinates of the sets of markers M in the two different planes or images into three-dimensional coordinates" (see column 5, lines 18-20). This unit 333 is not described


further, but it is evident that no photogrammetric manipulation of the images takes place as such photogrammetry would only be used with stereo or the like images and the images produced by the two cameras of the Oh patent are not stereo and in particular are not pointed in substantially the same direction as claimed.

After first stating (evidently in error) that the Oh patent discloses two spaced TV cameras provided on a display, the examiner acknowledges that such a disclosure is not made in the Oh patent but indicates that such is obvious from the Zimmerman patent. In the Zimmerman patent, a hand positioning sensing means includes a glove with ultrasonic transmitters affixed thereto and three spaced apart ultrasonic receiving units located on a display. A timing circuit determines a time delay between the transmitters and receivers, which time delay is translated into a glove position.

While the examiner has alleged that it would be obvious to orient the TV cameras of the Oh patent on a display as disclosed by the (different) receivers of the Zimmerman patent, it is submitted that such a position for the TV cameras of the Oh patent would not be obvious as it would render the system of the Oh patent inoperable. The two cameras in the Oh patent are spaced so far apart and are pointing with a large angle therebetween to assure a sufficiently large angle between them so that the cameras (30 and 31') are seeing more or less orthogonally (along two axes) to provide the X, Y and X, Z, data from which the position determination is to be made. Thus, putting the TV cameras together on a display as suggested by the Zimmerman patent would significantly adversely effect the ability of the TV cameras to view with sufficiently different pointing angles to allow for the position determinations to be made.

While it might be alleged that a timing circuit such as disclosed in the Zimmerman patent might then also be used for such closely spaced TV cameras of the hybrid combination, such a timing circuit would be difficult to operate considering the short time durations which would have to be measured. And in any event, as neither the Oh patent or the Zimmerman patent disclosed the "photogrammetric" determinations also specifically claimed, even if such a timing circuit were obvious it would still not make this additional feature of the invention claimed in amended claim 65 obvious.

As noted in the last Amendment (filed June 3, 2002), there are important reasons and advantages for using the stereo images produced by cameras pointing in a substantially same direction, and for using "photogrammetry" to determine positions therefrom. Therefore, for all of the foregoing reasons, it is submitted that amended independent claim 65 is allowable over the combination of the Oh patent and the Zimmerman patent. For these same reasons, it is also submitted that claims 66-79 dependent from claim 65 are similarly allowable.

In amended independent claims 80 and 81, it is claimed similarly to claim 65 that the two TV cameras are pointing in substantially the same direction. In addition, it is claimed that the stereo images provide a three dimensional orientation of the datums. As noted above, a 3D "orientation" produces roll, pitch and yaw information - which is different from a 3D position (X, Y, and Z coordinates). Such a 3D orientation  determination is not disclosed in either the Oh patent or the Zimmerman patent. Thus, independent claims 80 and 81 are allowable for the same reasons as discussed above for claim 65 with regard to the pointing feature of the TV cameras, and for the additional 3D orientation determination claimed in these independent claims.

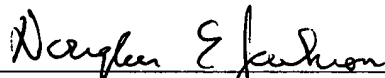
In amended independent claim 81, it is additionally claimed that a natural feature associated with the person is used as the datum. This feature is also claimed in dependent claim 67. As such a feature is also neither shown nor made obvious by the Oh patent or the Zimmerman patent, it is submitted that these claims are additionally allowable for this reason.

With respect to claims 70, 75-76 and 78 rejected over the Oh patent as applied to "claim 1" (presumably claim 65, and in combination with the Zimmerman patent) in view of the Naoi patent, it is submitted that these claims are patentable at least for the same reasons as independent claim 65 from which they depend.

For all of the foregoing reasons, it is submitted that the present application is in condition for allowance and such action is solicited.

Respectfully submitted,

Date: February 12, 2003


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ATTACHMENT
Amendments to the Claims

Following herewith is a complete listing of the claims, including a marked copy of the amended claims.

Claims 1-64 (canceled)

Sub F1
65. (currently amended) A method for input by a person of data to a computer having a display comprising the steps of:

- providing at least two spaced TV cameras provided on said display, said at least two TV cameras being pointed in substantially a same direction away from said display ^(220, 230) ^{4,30-32} ^{Fig 3} for acquiring at least a stereo pair of images of one or more datums associated with the person; ⁽²⁴⁰⁾ ⁽¹⁶⁰⁾
- photogrammetrically determining, from said stereo pair of images acquired by said TV cameras, the three dimensional position of at least one of said datums; and 2, 19-26
- controlling said display based on said position of said datum or datums. ←

E1
66. (previously added) A method according to claim 65, wherein said cameras are located on opposite sides of said display. Fig 3

67. (previously added) A method according to claim 65, wherein at least one of said datums is a natural feature of the person or clothing worn by the person. 2, 19-26

68. (previously added) A method according to claim 65, wherein at least one of said datums is an artificial feature on the person or clothing worn by the person. "

69. (previously added) A method according to claim 65, wherein at least one of said datums is distinguishable in reflected light. 2, 19-26

70. (previously added) A method according to claim 65, wherein a light source proximate each TV camera is used to illuminate said datums. "

71. (previously added) A method according to claim 65, wherein said display provides 3D graphical data concerning a virtual object which is manipulated by the person. 2-19-26

72. (previously added) A method according to claim 65, wherein datums on additional persons or portions thereof are sensed by said cameras, and information concerning position thereof is determined. obvious 44-512

73. (previously added) A method according to claim 65, wherein orientation of a portion of the person is also determined. 4, 45-63

objection

74. (previously added) A method according to claim 73, wherein the determined position and orientation is used to determine the point on a display indicated by of the person pointing at the display. 2, 19-26

75. (previously added) A method according to claim 65, wherein at least one of said datums is retroreflective. 267-3-3

76. (previously added) A method according to claim 65, wherein an IR LED light source is used to illuminate said datums. obvious 3 30-36

77. (previously added) A method according to claim 65, wherein at least one of said datums is distinctive in color or shape. 44-8

78. (previously added) A method according to claim 65, wherein at least one of said datums is in the shape of a point or line. 4, 4-8

79. (previously added) A method according to claim 65, wherein at least one of said datums is associated with a finger of the person 2, 19-26

80. (currently amended) A method for input by a person of data to a computer having a display comprising the steps of:

- providing at least two spaced TV cameras, said at least two TV cameras being pointed in substantially a same direction for acquiring at least a stereo pair of images of datums associated with the person;
- determining, from said stereo pair of images acquired by said TV cameras, the three dimensional orientation of said datums; and
- controlling said display based on said orientation of said datums.

81. (currently amended) A method for input by a person of data to a computer having a display comprising the steps of:

- providing at least two spaced TV cameras, said at least two TV cameras being pointed in substantially a same direction for acquiring at least a stereo pair of images of datums associated with the person, at least one of said datums being a natural feature associated with said person;
- photogrammetrically determining, from said stereo pair of images acquired by said TV cameras, the three dimensional orientation of at least said at least one datum; and
- controlling said display based on said orientation of said at least one datum.